California Regional Water Quality Control Board
Central Coast Region

Total Maximum Daily Load for Nutrients and Total Maximum Daily Load for Salinity/TDS/Chlorides for the Santa Ynez River, Santa Barbara County, California

Project Charter
06 August 2007

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and
Total Maximum Daily Load for Salinity/TDS/Chlorides
for the Santa Ynez River, Santa Barbara County, California

Adopted by the
California Regional Water Quality Control Board
Central Coast Region
on ___*not scheduled*_, 200x

Approved by the
State Water Resources Control Board
on ___*not scheduled*_, 200 x
and the
Office of Administrative Law
on___*not scheduled*_, 200 x
and the
United States Environmental Protection Agency
on ___*not scheduled*_, 200 x

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Project Status and Background

The state's guidance for addressing impaired waters (Process for Addressing Impaired Waters in California, June 2005) describes eight phases for addressing impaired waters. These eight phases are referred to as:

1. Phase-1; Project Definition
2. Phase-2; Project Planning
3. Phase-3; Data Collection
4. Phase-4; Project Analyses
5. Phase-5; Regulatory Action Selection
6. Phase-6; Regulatory Process
7. Phase-7; Approval
8. Phase-8; Implementation

The Total Maximum Daily Load for nutrients and the Total Maximum Daily Load for salinity/TDS/chlorides project (Project) is in Phase-1, the Project Definition Phase. The Project Definition phase includes development of a Project Charter and Project Definition. This document, the Draft Project Charter, completes the Phase-1 tasks for the Project.

The Santa Ynez River (River) was listed on the 303(d) list of impaired waters in 1998 for nutrients. In addition, the River was listed in a separate listing as impaired due to salinity, total dissolved solids (TDS), and chlorides. During the last stages of staff's development of this Charter, the 303(d) nutrient listing was changed to "nitrate" on the 2006 303(d) list, because staff found that only nitrate levels exceeded a water quality objective and no other "nutrient" impairments could be confirmed. The Santa Ynez River is now, at the time of this document finalization, listed as impaired due to nitrate, and is no longer listed for nutrients. However, since staff began analysis of the nutrient listing, this analysis is included in this document; analysis of the nutrient listing includes analysis for biostimulation. An analysis of the nitrate impairment is also included. In addition, as will be seen, this document includes analysis for the salinity/TDS/chlorides listing. Staff included assessment of the salinity/TDS/chlorides listing in this document because of the potential that both listings were driven from similar pollutant sources. Therefore, this Project Charter considers both the listing for the nitrate, as well as the listing for salinity/TDS/chlorides.

Based on preparation of this Project Charter and consideration of other TMDL project priorities, Water Board staff (staff) has not scheduled additional work on this Project at this time; Staff recategorized this Project as low priority during the development of this Project Charter. This is because staff determined that the impairment for the nutrient listing is associated with exceedances of the nitrate objective water quality objective, but nitrate loading is already being addressed through modification and implementation of an existing National Pollutant Discharge Elimination System (NPDES) permit. Staff also determined that the impairment for salinity/TDS/chloride is likely from natural sources and not driven

by controllable sources. Finally, the river *may* be impaired from biostimulation. However, due to the uncertainty of the biostimulation conditions and research needs to investigate this further, staff determined that this potential impairment is low priority at this time.

The nitrate impairment is due to a single point discharge of a wastewater treatment plant. The wastewater treatment plant is currently regulated by the Water Board under an NPDES permit. The current regulation has led to the wastewater treatment plant developing a technological upgrade to the plant that will eliminate the impairment due to nitrate. The plant is in the design phase and is expected to be running by 2011.

Through the development of this Project Charter, as well as ongoing research occurring on a statewide level, staff determined that the River *may* be impaired due to biostimulation. This means that algae and macrophyte (large aquatic plants) levels in the River may be negatively affecting aquatic life. However, staff must do more research and work to make this determination. Uncertainties exist on a regional and state level regarding distinction between naturally occurring algal levels, and algae levels resulting from human activities; what levels negatively impact aquatic life; and how to control algal levels to a point that they are not negatively impacting aquatic life.

In May 2007, staff from several programs of the Water Board met to discuss how to best proceed with the Project, given the circumstances. Staff representing the permitting program (David LaCaro), Central Coast Ambient Monitoring Program (Mary Adams), and the TMDL and Watershed Assessment program (Chris Rose) reached a consensus regarding how the Project should proceed. Staff concluded the following:

1. The nitrate impairment was being addressed through an existing NPDES permit; the Project did not need to continue to address the impairment for nitrate.
2. The Project was a lower priority (relative to other projects addressing impaired water bodies) because the known impairment from the exceedance of the nitrate objective was being addressed through the NPDES permit. In addition, salinity, total dissolved solids (TDS), and chloride exceedances were likely from natural sources, not controllable sources. Finally, the potential impairment from biostimulation was uncertain and methods to clarify the biostimulation impairment were also uncertain.
3. A future project addressing a nutrient-related listing in the Santa Ynez River should incorporate an analysis of biostimulation. Staff expects uncertainties in the scientific community regarding ways to analyze for biostimulation to be addressed over the next few years (due to current state-level and scientific research), after which time staff would re-assess the priority of this Project and how best to proceed.

This Project Charter will provide a head start in the future development of a Project Plan, should and when staff determine to proceed with this Project. Please see that the last sections of this Project Charter contain the basic elements of a Project Charter. The Project Charter elements were completed using the information contained in the Sections that follow.

Clean Water Act Section 303(d) Listings

The Santa Ynez River (River) was placed on the Clean Water Act section 303(d) list of impaired waters in 1998. The 303(d) list identified "nutrients" as the stressor causing impairment in the River, and the source identified as "nonpoint source." A listing for nutrients is most commonly interpreted as impairment caused by nitrogen and/or phosphorus compounds, but may include any combination of macro or micro nutrients used by plants and animals.

A review of available data leading to the 1998 listing lead staff to conclude that the listing was prompted by conductivity data and best professional judgment. Specific conductance in the River exceeded levels recommended by the Environmental Protection Agency (EPA) at the time of the 303(d) listing. The best professional judgment was based on land uses in the project area, e.g., irrigated agricultural activities, and perhaps the presence of benthic algae and macrophytes.

The 2006 303(d) list revised the nutrient listing to "nitrate." At the time of this document preparation, the River was listed for nitrate, and not nutrients. However, staff included analysis of biostimulation in this charter as well as for nitrate.

The 1998 303(d) list also listed the River as impaired due to salinity/TDS/chlorides. No other data, other than the specific conductivity data, accompanied the information prompting the listing. Therefore, staff concluded that the 1998 listing for salinity/TDS/chlorides was also prompted by the specific conductivity data.

1. Project Location

The Santa Ynez River is located in Santa Barbara County, north of the City of Santa Barbara, and south of the City of Santa Maria. Figure 1 shows the location of the Santa Ynez River watershed (watershed). More detailed maps of the watershed are provided at the end of this document.

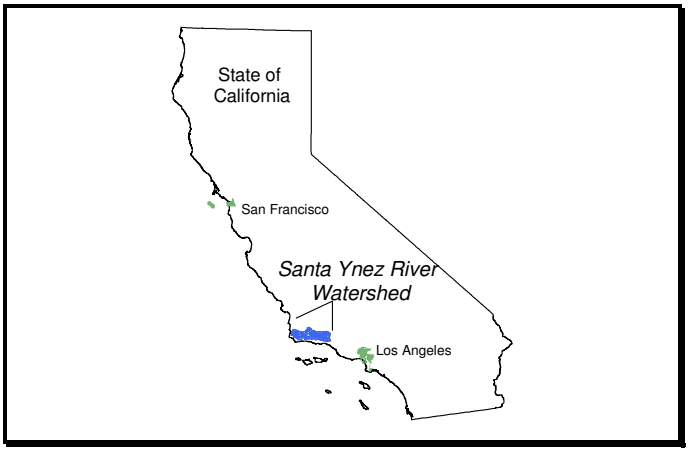

Figure 1 Location of Santa Ynez River Watershed

Designated Beneficial Uses, Existing Water Quality Objectives, and Permit Requirements

The Water Quality Control Plan of the Central Coast Region (Basin Plan) identifies beneficial uses associated with the Santa Ynez River. The beneficial uses are identified in Table 1. Also note that the beneficial uses associated with the Santa Ynez Estuary (Estuary) are identified. These beneficial uses are identified because the Estuary is a receiving water of the River.

Table 1 Beneficial Uses

	MUN	AGR	IND	GWR	REC1	REC2	WILD	COLD	WARM	MIGR
Santa Ynez River Estuary					X	X	X		X	X
Santa Ynez River (downstream)[1]	X	X	X	X	X	X	X	X	X	X
Santa Ynez River (upstream)[1]	X	X	X	X	X	X	X	X	X	X
	SPWN	BIOL	RARE	EST	FRESH	NAV	POW	COMM	AQUA	SHELL
Santa Ynez River Estuary	X	X	X	X						X
Santa Ynez River	X		X		X			X		
Santa Ynez River (upstream)[1]	X		X		X			X		

[1] Refers to upstream and downstream of the Cachuma Reservoir

MUN: Municipal and domestic water supply
AGR: Agricultural supply
IND: Industrial service supply
GWR: Ground water recharge
REC1: Water contact recreation
REC2: Non-Contact water recreation
WILD: Wildlife habitat
COLD: Cold freshwater habitat
WARM: Warm freshwater habitat
MIGR: Migration of aquatic organisms
SPWN: Spawning, reproduction, and/or early development
BIOL: Preservation of biological habitats of special significance

RARE: Rare, threatened, or endangered species
EST: Estuarine habitat
FRESH: Freshwater replenishment
NAV: Navigation
POW: Hydropower generation
COMM: Commercial and sport fishing
AQUA: Aquaculture
SHELL: Shellfish harvesting

Table 2 shows existing water quality objectives identified in the Basin Plan. The "Reference" column shows the source of the criteria, and the "Used for Analysis" column indicates whether the criteria was used to determine and characterize impairment by analyzing exceedances of this criteria for this document.

Table 2 Existing water quality objectives and permit requirements.

Constituent	Protective Level	Reference[1]	Used for Analysis?
Biostimulatory Substances	"Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses." For purposes of analysis of exceedance, the following indicators are used:	Basin Plan (General Objective)	Y
	Phosphorus (inorganic): <0.4 mg/L	EPA Recommendation	
	Nitrogen (inorganic): <3.0 mg/L	Best Professional Judgment	
	Benthic Algae Aerial Cover: <40%	Best Professional Judgment	
	Benthic Algal Density <150 mg chlor-a/m^2	Best Professional Judgment	
	Above indicators in combination with exceedances of dissolved oxygen (DO)objectives: (DO must be ≥ 7.0 mg/L)	Best Professional Judgment	
Nitrate (NO_3-N)	10 mg/L-N	Basin Plan (MUN)	Y
Nitrate (NO_3-N)	5 mg/L-N	Basin Plan (AGR, for sensitive crops)	
Un-ionized Ammonia (NH_3-N)	0.025 mg/L	Basin Plan (General Objective)	Y
Ammonium (NH_4-N)	5 mg/L-N	Basin Plan (AGR, for sensitive crops)	
Sodium (Na)	< 69 mg/L	Basin Plan (AGR; using	

		overhead irrigation)	
Chloride	< 106 mg/L	Basin Plan (AGR; using overhead irrigation)	
Chloride	20	Basin Plan (Santa Ynez River; Cachuma Res.)	Y
Chloride	50	Basin Plan (Santa Ynez River; Solvang)	Y
Chloride	100	Basin Plan (Santa Ynez River; Lompoc)	Y
Sodium (Na)	50	Basin Plan (Santa Ynez River; Cachuma Res.)	Y
Sodium (Na)	60	Basin Plan (Santa Ynez River; Solvang)	Y
Constituent	**Protective Level**	**Reference[1]**	**Used for Analysis?**
Sodium (Na)	100	Basin Plan (Santa Ynez River; Lompoc)	Y
Salinity (Electrical Conductivity)	< 0.75 mmho/cm	Basin Plan (AGR; using irrigation water)	Y
Total Dissolved Solids (TDS)	600 mg/L	Basin Plan (Santa Ynez River; Cachuma Res.)	Y
Total Dissolved Solids (TDS)	700 mg/L	Basin Plan (Santa Ynez River; Solvang)	Y
Total Dissolved Solids (TDS)	1000 mg/L	Basin Plan (Santa Ynez River; Lompoc)	Y

1: The Reference column shows the source of the criteria used for analysis.

Key Pollutants, Exceedances and Sources

1. Key Pollutants

Staff compiled existing data on the following pollutants:

- Nitrate-N
- Un-ionized ammonia
- Chloride
- Sodium
- Total dissolved solids (TDS)
- Salinity
- Phosphorus

Staff also considered the water quality parameters of:

- Dissolved oxygen
- PH
- Temperature
- Algal cover

Staff compared data for these pollutants and indicators to the water quality objectives and recommended levels indicated by a "Y" shown in Table 2. For TDS, sodium, and chloride, water quality objectives were associated with specific reaches of the Santa Ynez River; these geographic associations were considered in the exceedance analysis.

2. Data Available

Available data included:

1. Ambient monitoring data from Central Coast Ambient Monitoring Program (CCAMP)

2. Monitoring reports associated with the Lompoc Regional wastewater treatment plant (LRWWTP)

3. Monitoring results from the Conditional Waiver of Waste Discharge Requirements from Irrigated Lands (Agricultural Waiver)

4. Geographic Information Systems (GIS) layers for land use, hydrography, elevation, roads, etc.

If further analysis is required, e.g., through development of a TMDL, Use Attainability Analysis, site-specific objective, or another option requiring data analysis, staff will investigate the existence of additional datasets. Some agencies, municipalities, and environmental groups may have data that can be considered, if existing and appropriate.

Staff compiled and used the CCAMP and LRWWTP (2001 and 2002) data sets for the analysis in this Project Charter.

3. Exceedances and Potential Causes

Staff compiled and compared the CCAMP and LRWWTP data to the water quality objectives and recommendations listed with a "Y" in Table 2. Secondly staff analyzed exceedances of the objectives and recommendations.

Staff used a ten percent frequency of exceedance as the basis of impairment in the analysis; a minimum of five samples was used for this approach.[1]

Staff developed two maps showing land uses and monitoring site locations that are provided at the end of this document; see Figure 10 and Figure 11. Monitoring sites shown in these figures are referred to in the following discussion.

[1] Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Water Resources Control Board)

A. Nitrate and Un-ionized Ammonia

Staff developed Figure 2 and Figure 3 using the CCAMP dataset. This dataset included monthly data of eight monitoring sites with twelve to thirty-six months sampled from each site. Data spanned all seasons for each monitoring site. Some sites did not flow during summer months.

Figure 2 shows the percent of data exceeding the water quality objective for nitrate of 10 mg/L-N, protecting the MUN beneficial use. Note the following:

- Exceedance of the nitrate objective occurred in the lower portion of the watershed, specifically downstream of the Lompoc Regional wastewater treatment plan (LRWWTP), agricultural land use, and the city of Lompoc (see Figure 10 for comparison to land uses).
- More than five samples and more than ten percent of the data exceeded the nitrate objective, indicating that the lower portion of the River was impaired due to exceedance of this objective.

The data for un-ionized ammonia indicated that there was not impairment due to exceedance of the un-ionized ammonia objective (0.025 mg/L-N); a maximum of two samples at a site exceeded the objective, but a minimum of five were needed to imply impairment. The exceedances occurred at sites 314SYN and 314SYF; the same sites where the nitrate objective was exceeded.

B. Biostimulation

Figure 3 shows the percent of nitrogen and phosphorus data that exceeded recommended levels to control biostimulation (see Table 2 for recommendations). The figure also illustrates exceedances of the dissolved oxygen water quality objectives as well as exceedances of the recommended level for benthic algae (see Table 2 for recommendations). Nitrate and orthophosphorus levels shown in Figure 3 were used as indicators of the inorganic fractions of nitrogen and phosphorus. Staff believed these were reasonable surrogates because data indicated that most of the total nitrogen and phosphorus were in the form of nitrate and orthophosphorus.

Note that that staff arranged the monitoring sites from left to right in Figure 3, i.e., from the mouth of the Santa Ynez River to the headwaters, respectively. For the sake of this analysis, a ten percent frequency of exceedence was used as the basis of impairment.

Figure 3 shows that the frequency of exceedance for nitrate-N and orthophosphorus increased downstream of the LRWWTP discharge. Note that greater than eighty percent of the orthophosphorus data and over fifty percent of the nitrate-N data exceeded water quality recommendations for these pollutants. A reduction of exceedance is seen from 314SYF to 314SYN (a distance of four miles), which may have been the result of attenuation and/or dilution of these nutrients.

Also note from Figure 3 that dissolved oxygen and benthic algae exceedances occurred not only at sites where there were frequent nitrate and orthophosphorus exceedances, but also in upstream waters where nitrate and orthophosphorus levels were not in exceedance of objectives. This lead staff to question whether aquatic growths and dissolved oxygen exceedances were strictly driven by nutrient levels.

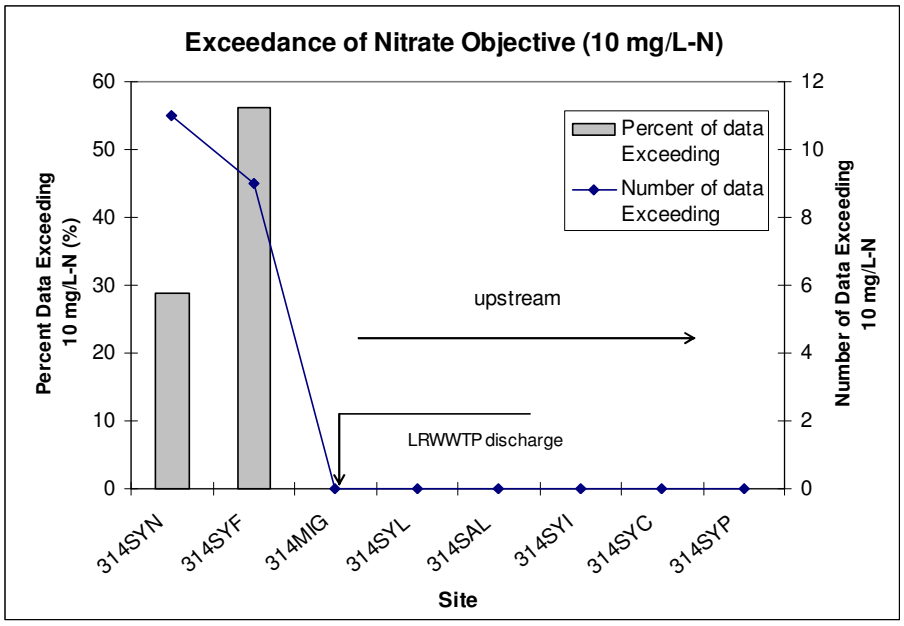

Figure 2 Exceedance of the nitrate water quality objective (10 mg/L-N).

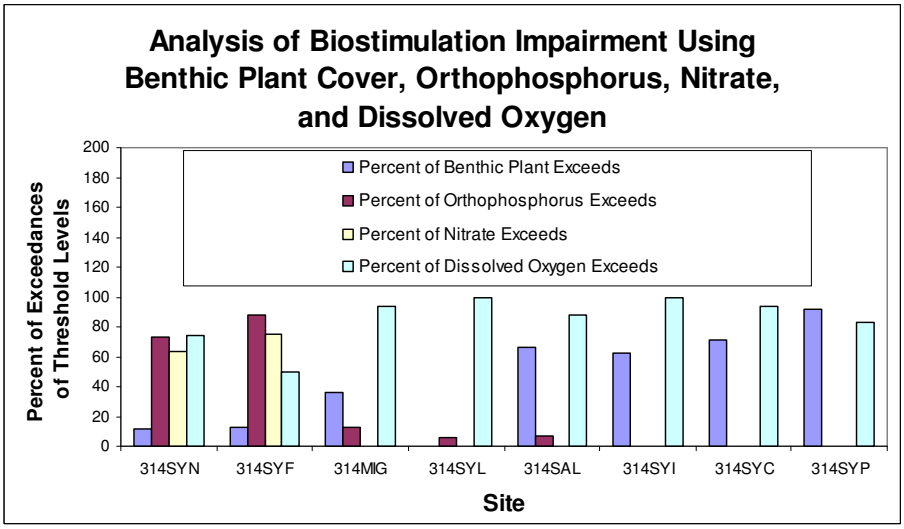

Figure 3 Percent of data exceeding water quality objectives.

The recommended nitrogen and phosphorus levels are related to the biostimulatory substances water quality objective, but alone do not indicate exceedance of the biostimulatory substances objective. Typical indicators of biostimulation may also include:

1. Presence of nuisance levels of algae, indicated by:
    a. Benthic algal density in excess of 150 mg/m^2 chlor-a.
    b. Exceedance of the dissolved oxygen objective (7 mg/L) measured on a 24-hour basis (pre-dawn oxygen sag is typical of nuisance algae levels), measured at several spaced monitoring stations.
        i. Corresponding pH fluctuations measured on a 24-hour basis measured at several spaced monitoring stations.
2. Absence of other factors that could cause nuisance levels of algae and/or low dissolved oxygen, e.g.,
    a. Excess solar radiation.
    b. Temperature increases caused by discharges and/or excess solar radiation.
    c. Loading of salts.
    d. Low flow conditions.

Low dissolved oxygen can be caused by algae, but can also be caused by the factors listed in bullet-2 above. An indication that algae is causing dissolved oxygen fluctuations may include a corresponding fluctuation in pH.

Figure 4 illustrates a 24-hour dissolved oxygen curve and corresponding pH and temperature curves in August 2004 at site 310SYN. Recall that this site is downstream of the discharge of the LRWWTP (see Figure 3 for nutrient exceedances).

Figure 5 illustrates the same water quality parameters in August 2005, also at site 310SYN. In 2004 there were 38 readings of dissolved oxygen falling below 7 mg/L (the protective level for cold water aquatic life). In 2005, 14 readings fell below 7 mg/L; readings were taken every 30 minutes.

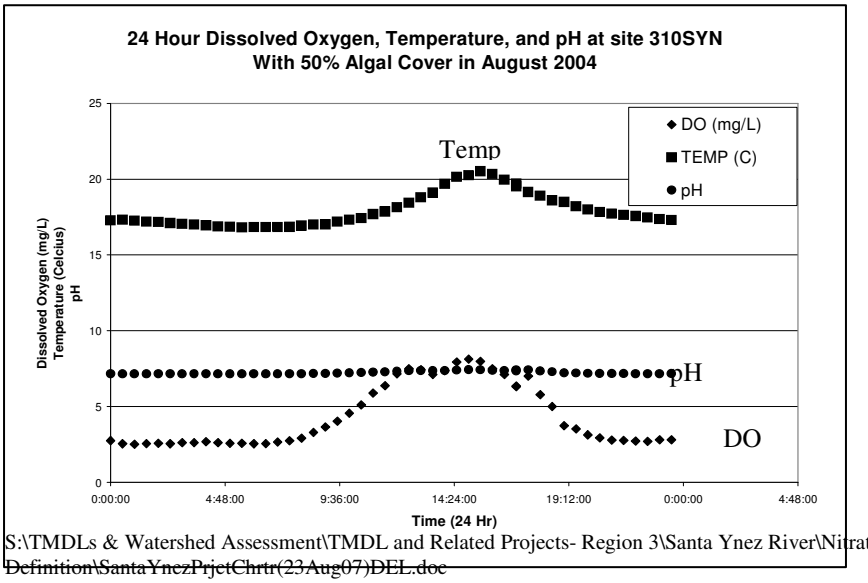

Figure 4 Dissolved oxygen, temperature, and pH 24-hour curves at site 310SYN in August 2004.

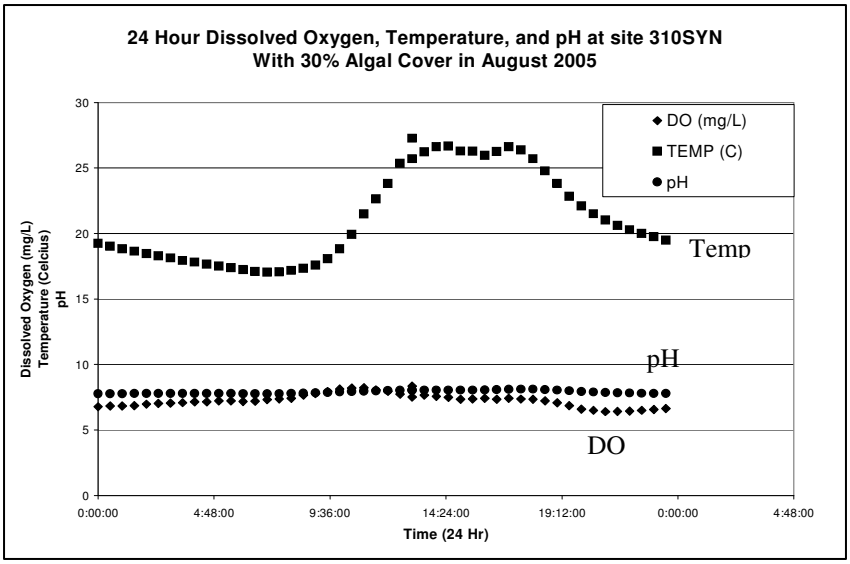

Figure 5 Dissolved oxygen, temperature, and pH 24-hour curve at site 310SYN in August 2005.

Both monitoring events had dissolved oxygen concentration falling below 7 mg/L over the 24-hour period. The low dissolved oxygen during both monitoring events occurred during predawn hours, indicating that the low dissolved oxygen could have, at least in part, been driven by the respiration of algae. Also note that algal aerial cover in 2004 was 50%, and 30% in 2005. Therefore, the target cover of 40% or below was not achieved in 2004, but was achieved in 2005. This information, as well as the data presented in Figure 3 indicating that monitoring site 310SYN had elevated nutrient concentrations, indicated that the biostimulatory substances objective was perhaps not achieved in 2004. However, other drivers of algal levels could not be ruled out.

Some information points to other causes of both low dissolved oxygen and the presence of algal cover in excess of 40%, i.e., causes other than biostimulatory substances. Note that there was a lack of corresponding pH fluctuation; if algae was the main driver of dissolved oxygen levels at site 310SYN, we would also expect pH fluctuation as well. In addition, temperature significantly rose during

the afternoon hours, indicating solar radiation driven temperatures. Solar radiation is a significant factor of algal presence and cover, even in the absence of anthropogenic nutrient loading. Therefore, the presence and cover of algae could have been driven by solar radiation, and not entirely by biostimulatory substances. Finally, as indicated in the discussion below, elevated salinity levels that were present in the watershed could have been contributing to low dissolved oxygen levels through the reduction of oxygen solubility.

The above information, Figure 4, and Figure 5, were from one monitoring site in the watershed. More information from more monitoring sites was needed to determine whether algae levels in the Santa Ynez River were at nuisance levels, and if they were, whether biostimulatory substances were causing them. In addition, more information and data was needed from more monitoring sites to determine whether low dissolved oxygen was being driven by the presence of algae, or other factors that affect dissolved oxygen. The information necessary to make these determinations is discussed in Project Objective Section at the end of this report.

Salinity, Total Dissolved Solids, and ChloridesFigure **6** shows the percent of data that exceeded water quality objectives related to the salinity/TDS/chlorides 303(d) listing. The monitoring sites are arranged in the same order as Figure 3, from the mouth of the River on the left, to upstream sites on the right.
Figure **6** illustrates that all of the constituents related to this listing had exceedances of the water quality objectives downstream of the LRWWTP discharge. However, the frequency of exceedances upstream of the LRWWTP discharge for some of the constituents and monitoring sites was similar to that of downstream of the discharge, indicating that the LRWWTP discharge was not solely responsible for the exceedances. For example, the TDS objective was exceeded at the most upstream site 314SYP, and the chloride objective was exceeded at sites 314MIG and 314SAL. The frequency of exceedance, and the fact that exceedances occurred at several monitoring sites upstream of the discharge, rules out a hypothesis that the LRWWTP discharge was the cause of exceedances; this is in contrast to the hypothesis that could be drawn from Figure 3 related to nitrate exceedances.

To further this point, exceedances of the chloride and sodium water quality objectives began at site 314SAL, and continued to downstream monitoring sites (with the exception of no exceedances of sodium at 314MIG). Note from Figure 10 and Figure 11 that urbanized and agricultural areas flanked these sites. Therefore, chloride and sodium exceedances may have been driven in part by agricultural and urban land uses. Furthermore, monitoring site 314MIG is located along the tributary San Miguelito Creek (tributary to the Santa Ynez River), and is a concrete lined channel flowing through the city of Lompoc. Exceedances of the chloride water quality objective at this site may indicate the urban contribution of chloride in the watershed and the potential for this land use to cause exceedances of this water quality objective.

Total dissolved solids (TDS) exceedances occurred at most of the monitoring sites. Site 314SYP is downstream from *undeveloped* lands. The widespread exceedance of the TDS (and to a lesser extent sodium) water quality objectives may indicate that natural TDS and sodium concentrations exceeded water quality objectives. This is in contrast to the nitrate-N objectives that were exceeded only in the lower reaches of the watershed.

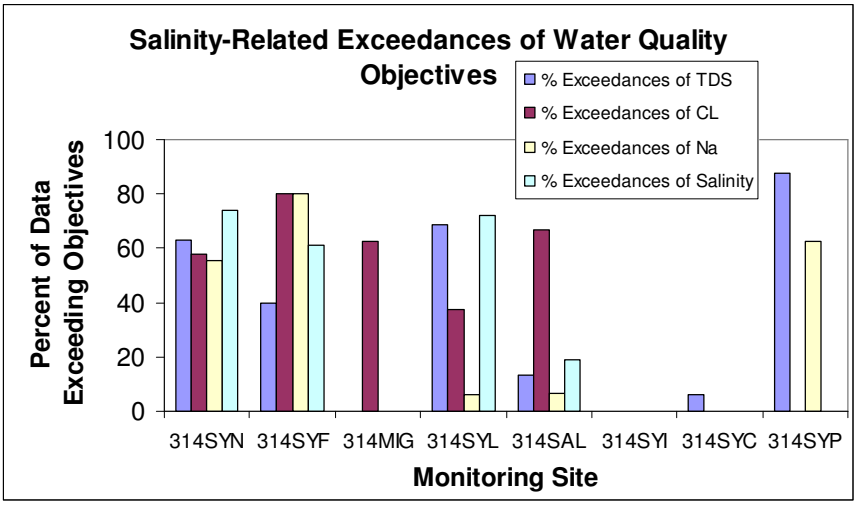

Figure 6 Percent of data exceeding water quality objectives.

Figure 7 shows quarterly concentrations in 2001 for nitrate-N, un-ionized ammonia, total phosphorus, chloride, sodium, and TDS. The vertical red-bars on the graphs indicate chloride concentration data from the LRWWTP effluent; LRWWTP effluent salinity data was not available so a graphic was not presented for this pollutant. The LRWWTP is a point discharge into San Miguelito Creek near its confluence with the Santa Ynez River. The horizontal red lines on the graphs indicate water quality objectives for each pollutant.

The following observations were made from the graphs in Figure 7.

1. For nutrient data (nitrate, total phosphorus and un-ionized ammonia), concentration and exceedance was related to location in the watershed.
    a. Concentrations and exceedances were highest downstream of the LRWWTP discharge. This is consistent with Figure 3.
2. Choride, sodium, and TDS concentrations increased downstream of the LRWWTP discharge, but exceedances upstream of the discharge occurred as well.
3. There was a general trend of increasing TDS concentration in downstream waters, but concentration at the most upstream sites indicated that natural TDS concentration approached the water quality objective.

It is important to note that monitoring sites 314SYN and 314SYF are not only downstream of the LRWWTP discharge, but also downstream of agricultural land

use (See Figure 10). The agricultural land use could also have been contributing to the elevated nutrient and salinity-related concentrations. To investigate this point, nitrate-N, total phosphorus, chloride, and sodium were reviewed at these sites.

Figure 8 illustrates median nitrate-N and total phosphorus concentration at monitoring sites 314SYN and 314SYP. Recall that site 314SYN is the downstream most site and receives discharge from agricultural land uses upstream. Note in the figure that there is an apparent decrease in concentration in nitrate-N at site 314SYN.

Conversely, Figure 9 illustrates median chloride and sodium concentrations at sites 314SYN and 314SYF, and indicates an apparent concentration increase of these pollutants downstream of agricultural areas. The elevated sodium and chloride concentrations at site 314SYN may have resulted from sodium nitrate and potassium chloride applications, respectively, which are sometimes used as fertilizer. However, if the increases were due to fertilizer application alone, then one might also expect a corresponding increase in nitrate-N levels as well. This, however, is counter to Figure 8. Further analysis is needed to investigate this phenomenon.

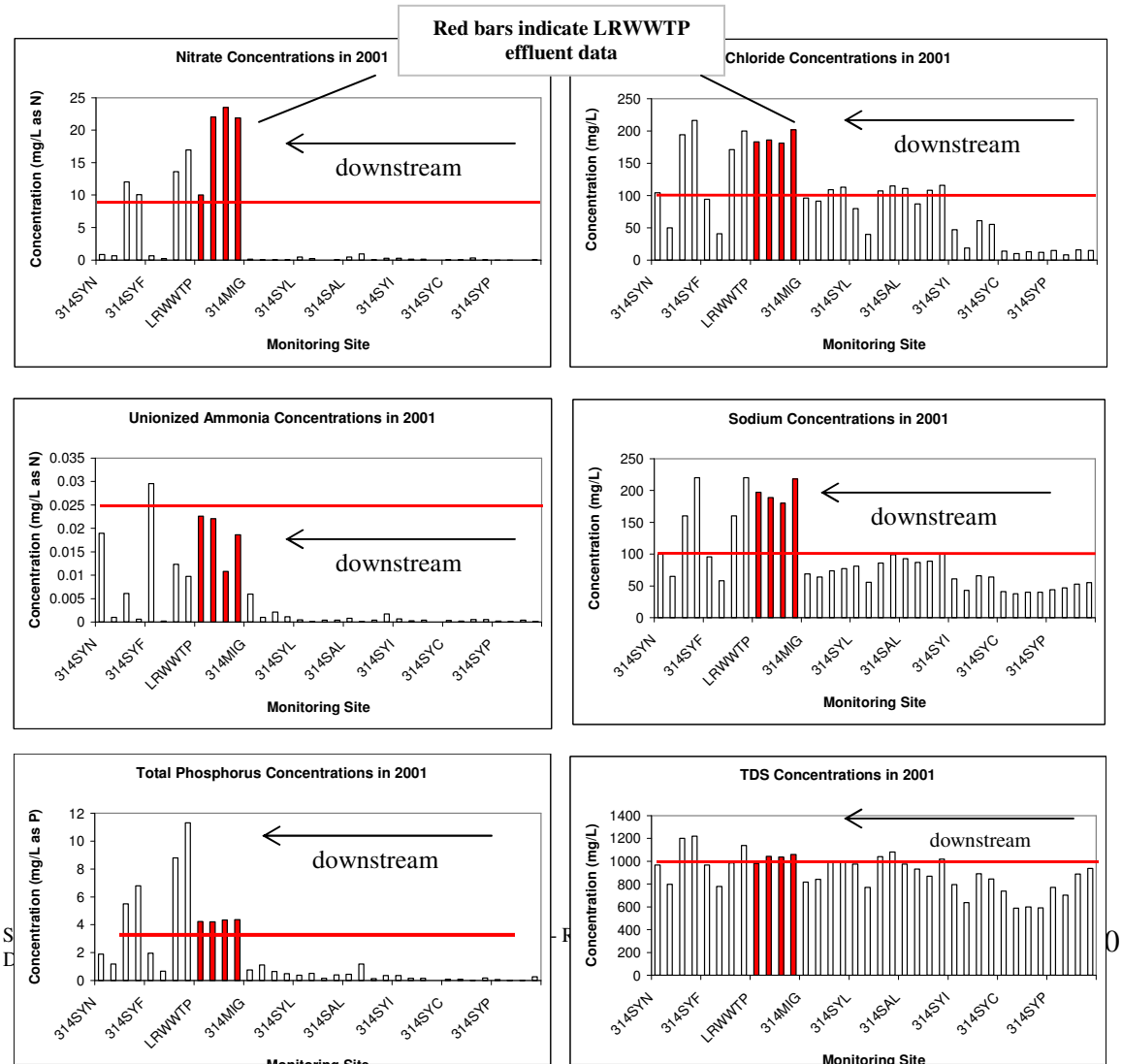

Figure 7 Quarterly 2001 nutrient and salts concentrations upstream to downstream .

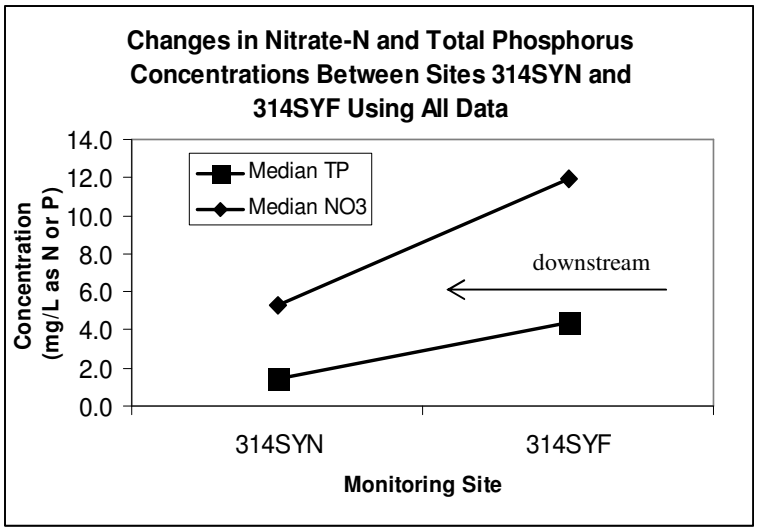

Figure 8 Changes in Nitrate-N and Total Phosphorus concentrations between sites 314SYN and 314SYF.

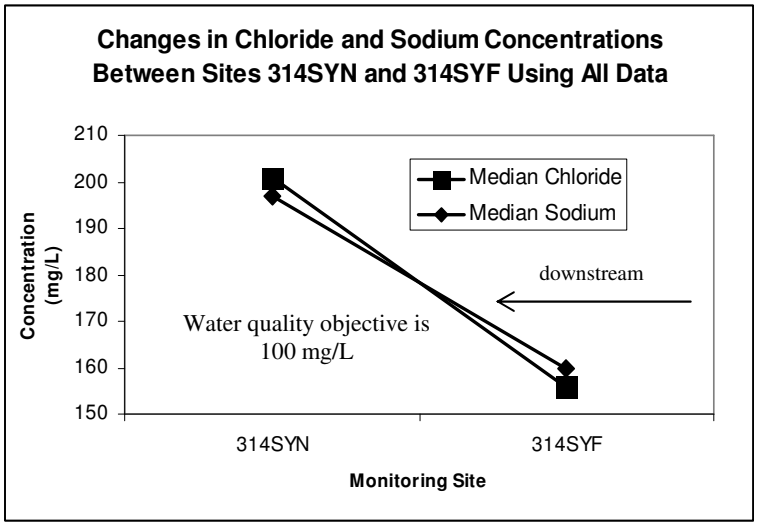

Figure 9 Median chloride and sodium concentrations at monitoring sites 314SYN and 314SYF.

Hypotheses and Approach to Addressing 303(d) Listings.

1. Hypotheses

Staff made the following hypotheses based on the information and data presented above:

1. Exceedances of the numeric water quality objectives for nitrate-N, un-ionized ammonia, dissolved oxygen, and the recommended level for phosphorus occurred in the lower reaches of the Santa Ynez River.
2. Exceedances of numeric water quality objectives and recommendation for nitrate-N, un-ionized ammonia, and total phosphorus were mainly being driven by the discharge from the Lompoc Regional wastewater treatment plant (LRWWTP). Other sources may have been contributing to the exceedances.
3. The Santa Ynez River was impaired due to exceedances of the nitrate numeric water quality objectives in the lower reaches.
4. Staff is uncertain whether the biostimulatory substances objective was being exceeded; more information was needed to make this determination. Low dissolved oxygen may have been driven by nuisance levels of algae, but other factors may have been contributing as well.
5. Exceedances of the water quality objectives for chloride, sodium, salinity, and total dissolved solids occurred intermittently from the headwater areas to the mouth of the Santa Ynez River.
6. Exceedances of water quality objectives for chloride, sodium, salinity, and total dissolved solids were being driven by several sources, including agricultural practices, discharges from urbanized areas, discharge from the LRWWTP, and natural sources.

2. Approach to Address Impairments

Staff recommends addressing the listing due to nutrients separate from the listing due to salinity/TDS/chlorides for the following reasons:

1. Exceedances of water quality objectives for salinity/TDS/chlorides occurred in different areas of the watershed compared to the exceedances of nutrients. Exceedances of the numeric water quality objectives for nitrate-N and un-ionized ammonia was driven predominately by a single point source (the LRWWTP), while the impairment due to salinity/TDS/chlorides was driven by multiple sources distributed upstream and downstream, including natural sources.
2. Natural sources of total dissolved solids and sodium may have caused exceedances of water quality objectives. Therefore, a different strategy (relative to nutrients), e.g., a site-specific objective, for addressing the

impairment may be necessary.

3. A different strategy, from the strategy to address the salinity/TDS/chlorides listing, will be needed to determine whether impairment from biostimulatory substances is occurring.

3. Addressing Biostimulation

Staff met internally to discuss the potential biostimulation impairment. The essential questions were: 1) is the biostimulation objective being exceeded in the Santa Ynez River, 2) what sort of data would we need to make this determination, 3) does that data exist? The following summarizes staff's determinations:

1. Staff is uncertain whether the biostimulation objective was being achieved or not in the Santa Ynez River.
2. Benthic algae density was likely greater than the recommended levels in some portions of the watershed, but it was not clear to staff whether the algal density present was being driven by controllable factors.
    a. Staff needed more data than was available to make this determination.
3. Staff was not certain of the precise data needed to answer whether biostimulation occurred, but staff recommended that the follow parameters be considered:
    a. Parameters necessary to run the California Numeric Nutrient Endpoint (NNE) model[2] including benthic algae density, in units of chlor-a mg/m^2 (or similar),
    b. Parameters needed to asses the biostimulatory risk index[3],
    c. Twenty-four hour dissolved oxygen, pH, and temperature data from several monitoring sites spaced along the Santa Ynez River,
    d. Information regarding channel substrate,
    e. An assessment of whether algal cover is impacting cold water species, particularly the native steelhead trout, and
    f. Determine the number of monitoring sites necessary to assess whether algal densities and corresponding low dissolved oxygen are negatively impacting native steelhead trout.
4. The assessment of biostimulation should be part of a project addressing a nutrient-related 303(d) listing.

4. Addressing the Nitrate and Un-ionized Ammonia Exceedances

Data and information suggested that the discharge from the LRWWTP was the main source causing exceedance of the nitrate and un-ionized ammonia numeric water quality objectives. This exceedance, as well as other problems associated with the LRWWTP discharge, led the City of Lompoc to design a new wastewater facility that would result in improved water quality in the effluent. The Central Coast Water Board adopted a revised NPDES permit in July 2006 [NPDES No. CA 0048127]. The adopted permit outlined numeric effluent limits for nitrate and

[2] California Nutrient Numeric Endpoints. Prepard by Tetra Tech, Inc. for the U.S. EPA Region IX. 2006.
[3] Developed by Central Coast Ambient Monitoring Program, Central Coast Region. 2006

un-ionized ammonia of 10 mg/L-N and 0.025 mg/L-N, respectively. Achieving the revised effluent limits should result in receiving water concentrations of these pollutants meeting the basin plan objectives for nitrate and un-ionized ammonia, resulting in these water quality objectives being met in the Santa Ynez River, provided staff's assumption is correct that the current discharge is causing the exceedances. It is anticipated that the upgraded facility will be operational no later than July 2011. Therefore, although staff recommended that the biostimulation question be addressed through further assessment, and would therefore require more time, the nitrate and un-ionized ammonia exceedances are expected to be addressed through the LRWWTP NPDES permit.

After the LRWWTP is operating the new plant and meeting effluent limits in the revised permit, staff will reevaluate whether the river is meeting nitrate and un-ionized ammonia water quality objectives. By the time the new plant is operational, any irrigated agricultural discharges that may have been contributing nitrate should also have reduced their nitrate loading due to implementation of farm water quality management practices, pursuant to the Conditional Waiver of Waste Discharge Requirements for Irrigated Agricultural Discharges.

If staff determines that the impairment is being addressed through the modified LRWWTP discharge, staff may recommend the 2006 303(d) listing for nitrate impairment be removed and placed on the 303(d) list of "Water Quality Segments Being Addressed by Other Actions Than TMDLs." If staff determines that the impairment has been resolved, staff will recommend that the listing for nitrate impairment be removed from the 303(d) list.

Project Charter

1. Problem/Opportunity Statement

The Santa Ynez River (River) was impaired due to the exceedance of water quality objective for nitrate-N in the lower reaches of the River. Consequently, the municipal and domestic water supply beneficial use was not protected due to elevated nitrate-N concentration. In addition, intermittent exceedances of the un-ionized ammonia objective were potentially toxic to aquatic species; the number of exceedances did not imply impairment. Therefore, beneficial uses related to aquatic habitat and species were not always being supported. Addressing the impairment for nitrate and exceedances of the un-ionized ammonia objective (while setting aside questions regarding biostimulation) provided the opportunity to protect these beneficial uses, the people that benefit from them, and the aquatic organisms residing in the Santa Ynez River.

As discussed in Section 4 above, the impairment from nitrate-N and exceedances of the un-ionized ammonia objective are currently being addressed by existing regulation through the LRWWTP NPDES permit and the Conditional

Waiver of Waste Discharge Requirements for Irrigated Agricultural Discharges. Staff has an opportunity to allow the regulations to address the impairment, rather than expending state resources on TMDL development.

The River may have been impaired due to the presence of excessive algae and other macrophytes that negatively affect aquatic organisms. Of particular concern was the potential threat to the federally listed steelhead trout, which were native to the River. Addressing the potential biostimulation impairment once a more definitive protocol for addressing this type of impairment was established would present an opportunity to test such a protocol. In addition, waiting for a more definitive protocol would also increase the probability of success. Please refer to Section 3 above, which explains staff's recommendations for addressing the potential impairment due to biostimulation. Please also refer to the Project Status and Background Section at the beginning of this document.

Natural levels of total dissolved solids and sodium likely exceeded water quality objectives in some, perhaps all, areas of the watershed. The Central Coast Ambient Monitoring Program is scheduled to gather more samples from the project area in the 2007-2008 sampling rotation. Waiting for the results of this monitoring will allow staff to better gauge the next course of action regarding the salinity/TDS/chlorides listing, e.g. making a determination whether naturally occurring levels exceed water quality objectives.

Therefore, staff recommends that resources not be spent on TMDL development addressing the nitrate impairment and exceedances of the un-ionized ammonia objective; these exceedances are being addressed through the LRWWTP NPDES permit and the Conditional Waiver of Waste Discharge Requirements for Irrigated Agricultural Discharges. Resources should be used to address the potential impairment due to biostimulation when a more definitive approach to biostimulation assessment and implementation is developed. In addition, staff recommends reviewing new salinity/TDS/chlorides data as it becomes available to discern whether the high concentrations present are naturally occurring.

2. Project Background

Please refer to the Project Status and Background Section at the beginning of this document.

3. Project Objective

To address biostimulation, the project objective will need to be defined after the approach to assess biostimulation is formulated. The project objective should summarize the project and succinctly cite what must be accomplished in order for the project to be successful. Given the uncertainties, at the time of this document preparation, regarding the biostimulation impairment and what might

be required to address the impairment, formulating a project objective was not feasible at the time of this document development.

Therefore, staff has recommended revisiting the project objective at a latter date, e.g., when there exists a clear understanding of the nature of impairment, if any, and how that impairment would be addressed.

To address the salinity/TDS/chlorides listing, the project objective will need to be defined after a determination is made whether these constituents naturally occur at levels exceeding water quality objectives.

4. Project Scope/Definition

When the Project commences, the scope of the nutrient-related project should include the assessment of impairment due to excessive aquatic growths, e.g., macrophytes and filamentous algae, in the River. Macrophytes (watercress) were particularly dense in the lower reaches at the time of this document preparation.

If staff re-prioritizes the salinity/TDS/chlorides listing to a higher priority, and work commences on this 303(d) listing, the salinity/TDS/chlorides listing should be addressed separate from the nutrient-related listing, i.e., as a separate project. Staff should be certain to consider salinity/TDS/chloride data from undeveloped areas in the headwaters of the watershed in the data analysis because current data suggests a natural source causing exceedance.

5. Stakeholders

Staff should identify key stakeholders for the project when the project commences and develop a Stakeholder Involvement Plan. Key stakeholders will likely include those shown in Table 3. This list was developed from Water Board staff knowledge of the project area and interested parties. The list is a draft list, and should be further developed as the project commences.

Table 3 Draft Stakeholder List

Agency/Entity	Contact	Contact Information
San Luis Obispo and Santa Barbara County Agriculture Coalition	Kay Mercer	(805) 928-6301
Cachuma Operations and Maintenance Board	Matt Loudon	(805) 687-4011
Santa Barbara County Water Agency	Rob Almy	(805) 569-1391
Natural Resource Conservation Service	John Bechtold	(805) -928-9269
Lompoc Regional Wastewater Facility	Susan Halpin	(805) -736-5083
Resource Conservation District	Tom Lockhart	(408) 424-1036
California Dept. of Fish and Game	Natasha Lohmus	(858) 467-4201
National Marine Fisheries Service	Matt McGoogan	(562) 980–4026

Santa Barbara County Agricultural Commission	Jim Bergman, Lisa Bodrogi	(805)681-5600
United States Fish and Wildlife Service	Nic Huber	(805) 644-1766
City of Lompoc	Stacy Lawson	(805) 875-8298
Farm Bureau	Steve Jordan	(805)-736-6529
Channel keepers	Kira Schmidt	(510)-770-9764
Santa Ynez Valley Water Conservation District	Bruce Wales	Santa Ynez River Water Conservation District P.O. Box 719 Santa Ynez, CA 93460
Vandenberg Air Force Base	Garry Sanchez	(805) 606-7541
Vandenberg Village Community Services District	Joe Barget	(805) 733-2475

6. Assumptions and Constraints

Assumptions:
Staff assumed that when the nutrient-related portion of the project commences, it would address the potential impairment due to biostimulation.

Based on staff's knowledge of the River, staff assumed that if the River was impaired due to biostimulation, the excessive aquatic growths would be macrophytes. Specifically, filamentous algae and watercress appeared to be driving low dissolved oxygen levels in the lower reaches (personal communication, Mary Adams, Central Coast Water Board, June 2007).

Staff assumed there will be increasing understanding and clarity regarding how to assess impairment due to biostimulation, and this clarity will be sufficient to develop a Project Plan addressing a nutrient-related listing.

Staff believed that the current available datasets, from CCAMP, the LRWWF, and Agricultural Wavier Monitoring, were not sufficient to assess the potential biostimulation impairment.

Staff assumed that salinity, TDS, and chloride levels in the River were likely occurring naturally at levels exceeding water quality objectives, and that this assumption could be checked with future data.

Constraints:
Staff believed that once even when there is clarity regarding how to address impairment from biostimulation, controlling nuisance algae and macrophytes will not be possible in this watershed. This is due to the width of the River (inability to create shade on the water surface) and damming of water in upper reaches thereby reducing flow.

The River is dammed in the upper reaches. Staff believed water releases could potentially be necessary to rectify impairment due to biostimulation. Staff predicted that there could be resistance from stakeholders to increased water

releases from reservoirs.

The California Numeric Nutrient Endpoint (NNE) model (see footnote 2) requires benthic algae in units of density. Staff recommends using this unit, but neither staff nor stakeholders had collected any data for this parameter. Data will need to be collected, likely from several monitoring sites over an extended period of time. This monitoring activity will be time consuming, costly, and represents a new approach to monitoring.

7. Related and Dependant Projects

The Central Coast Ambient Monitoring Program (CCAMP) anticipated monitoring activities in the Santa Ynez River during the fiscal year 2007-2008 rotation.

Staff anticipated that monitoring activities will occur for compliance with the requirements of the Conditional Waiver for Irrigated Agricultural Discharges.

At the time of this document preparation, staff had not developed, nor was aware of, a protocol for implementing the NNE. Staff urges that the NNE model be considered in future work related to assessment of biostimulation.

At the time of this document preparation, CCAMP staff had not fully developed the biostimulatory risk index. Staff urges that the index be considered in future work related to assessment of biostimulation.

8. Critical Success Factors

Success factors include:
Staff should clearly identify the impact that biostimulation has on cold water species, particularly steelhead trout.

Staff should demonstrate that implementing measures outlined in a future nutrient-related TMDL will result in alleviating stress on cold water species, specifically steelhead trout.

Staff should seek early coordination with key stakeholders. See the stakeholder list in Section 5 above.

9. Resources

A staff person working on a nutrient-related listing project should have an understanding of the relationships between macrophytes, nutrients, substrate, dissolved oxygen, flow, and how these parameters affect fisheries, particularly steelhead trout.

Staff developed a spreadsheet with all the available data to date. The spreadsheet is titled: SantaYnezNutTMDL(27June07).xls

Staff developed GIS layers for this Draft Project Charter. These layers can be accessed using the ArcMap file titled: SantaYnez(27June07).mxd

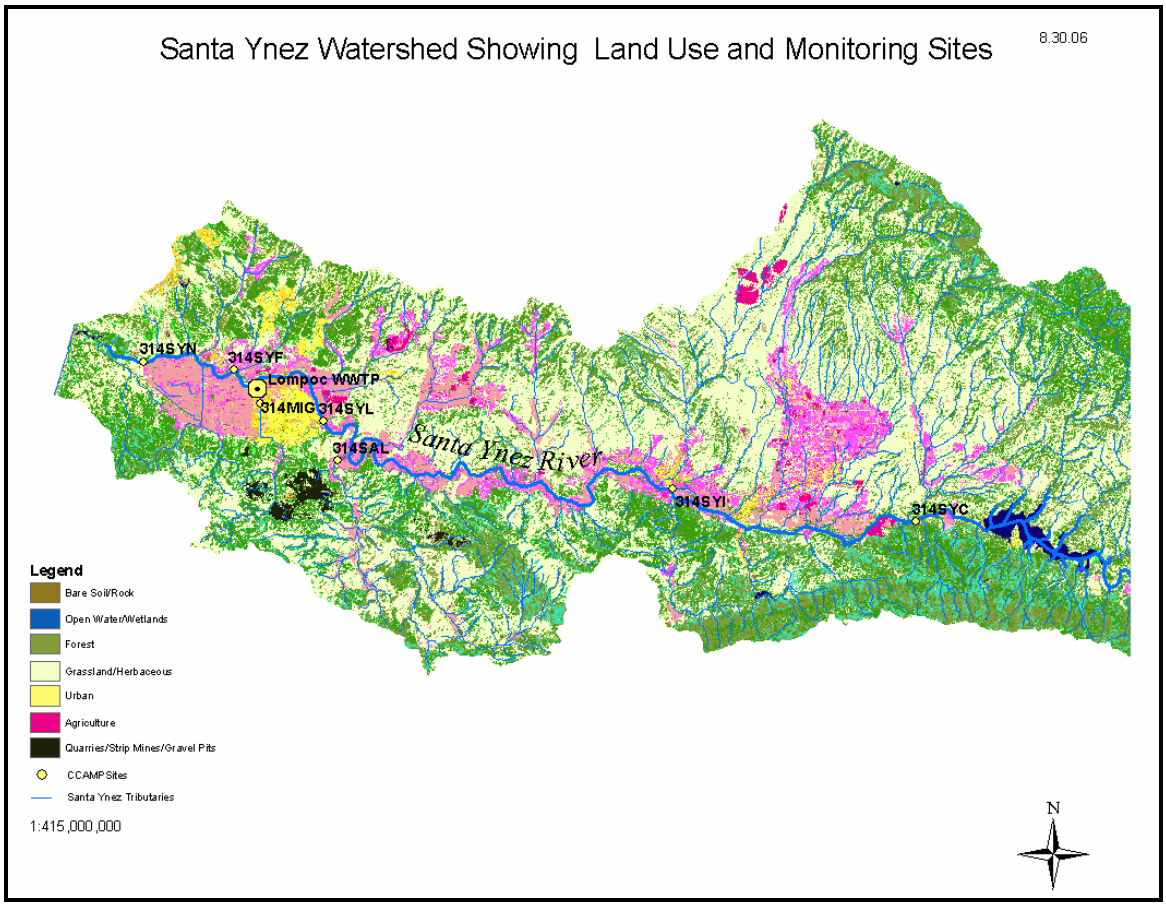

Figure 10 Land uses and monitoring sites of the western portion of the Santa Ynez Watershed.

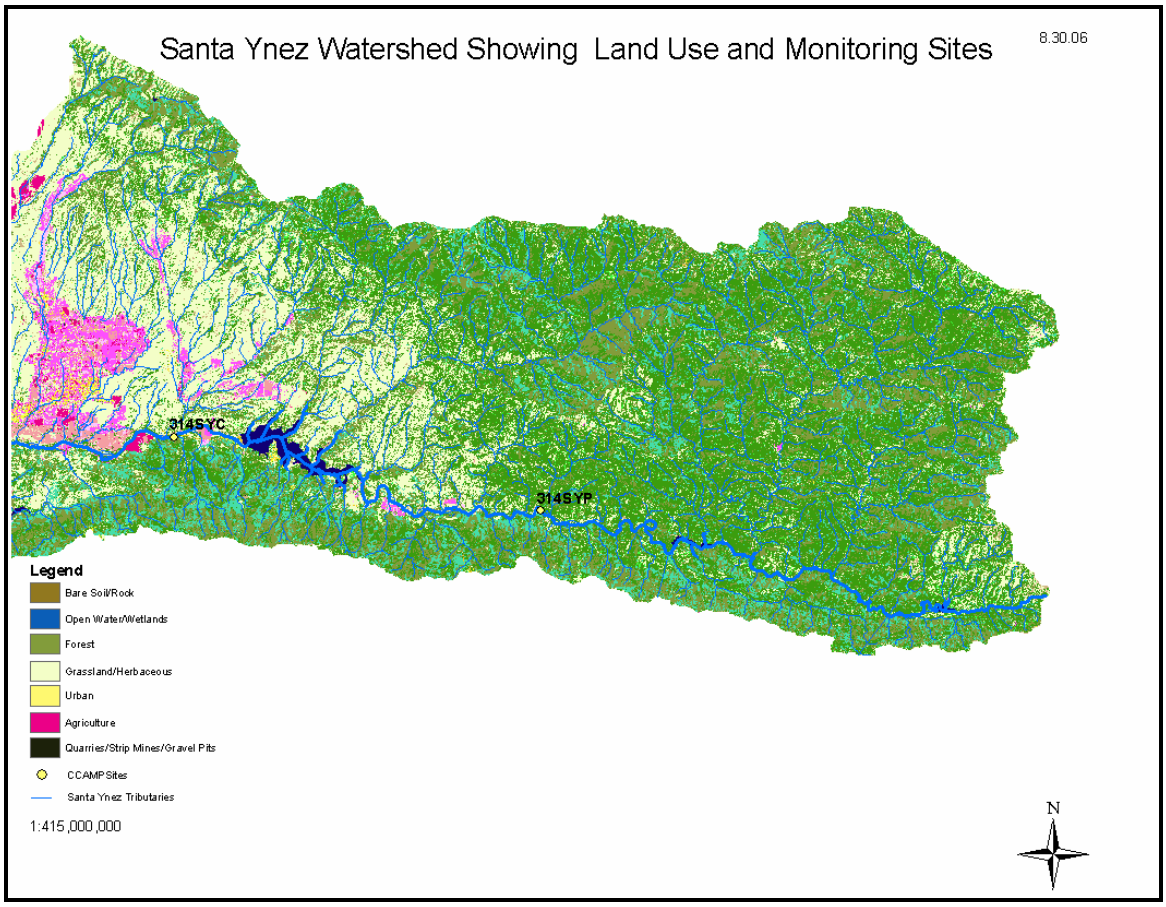

Figure 11 Land uses and monitoring sites of the eastern portion of the Santa Ynez Watershed.